

June 5, 1934.

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1,961,762

ROTARY DRILL PIPE COLLAR OR COUPLING WITH SEALED JOINTS

Filed April 25, 1930

Fig. 1.

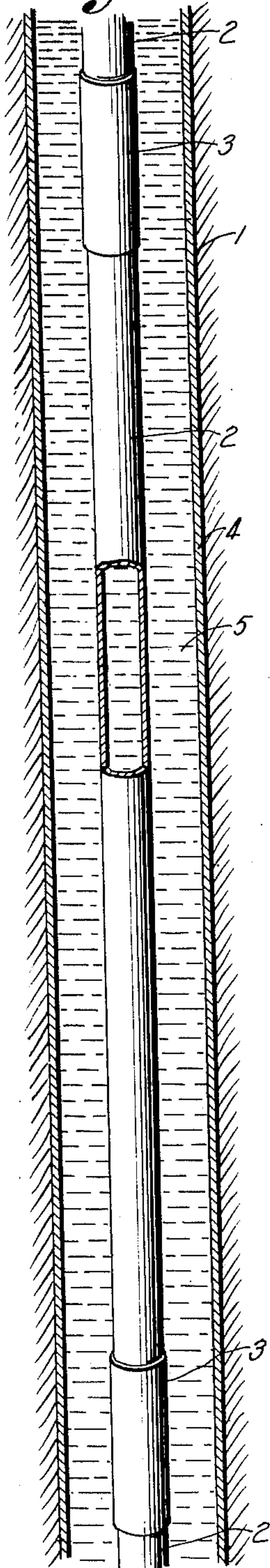


Fig. 2.

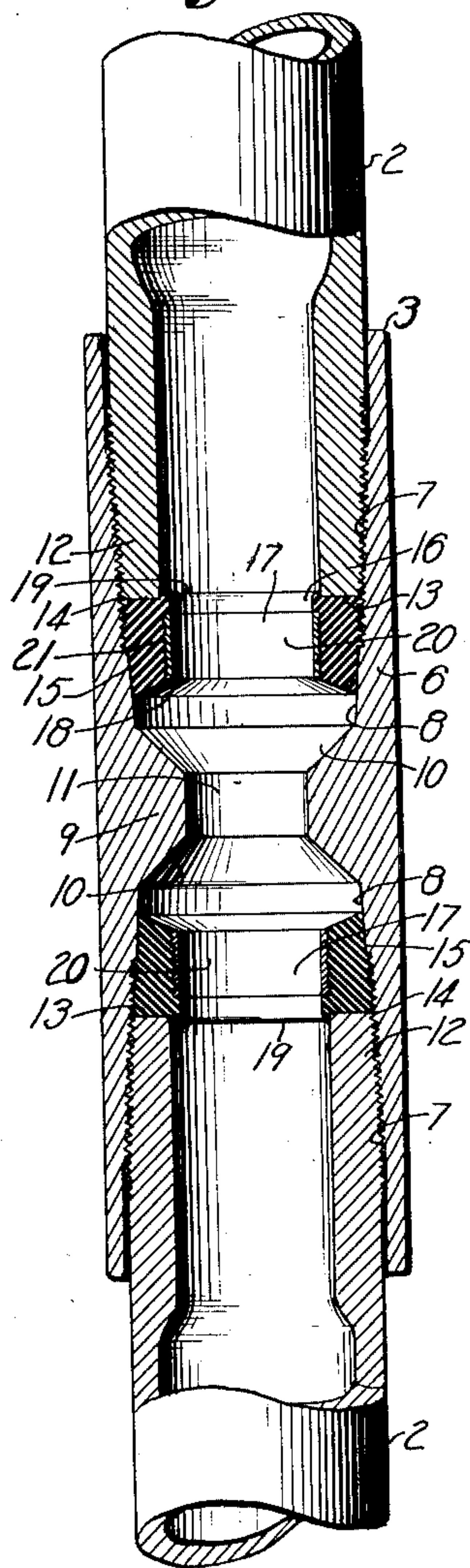


Fig. 3.

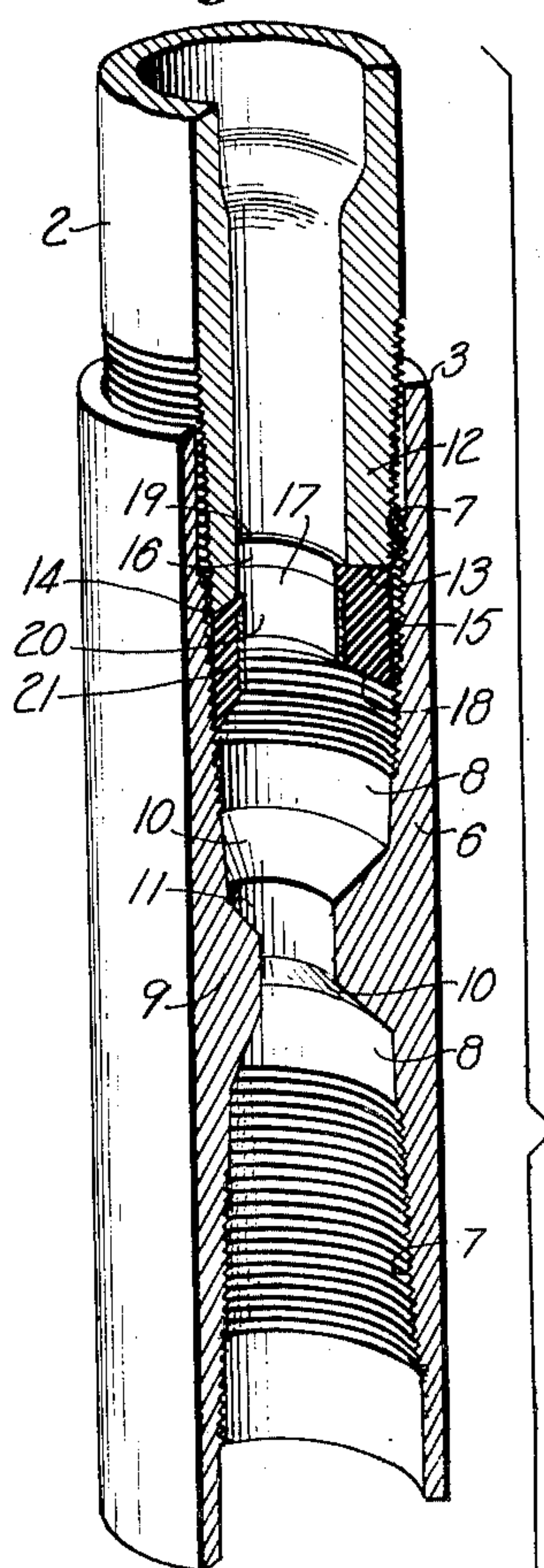
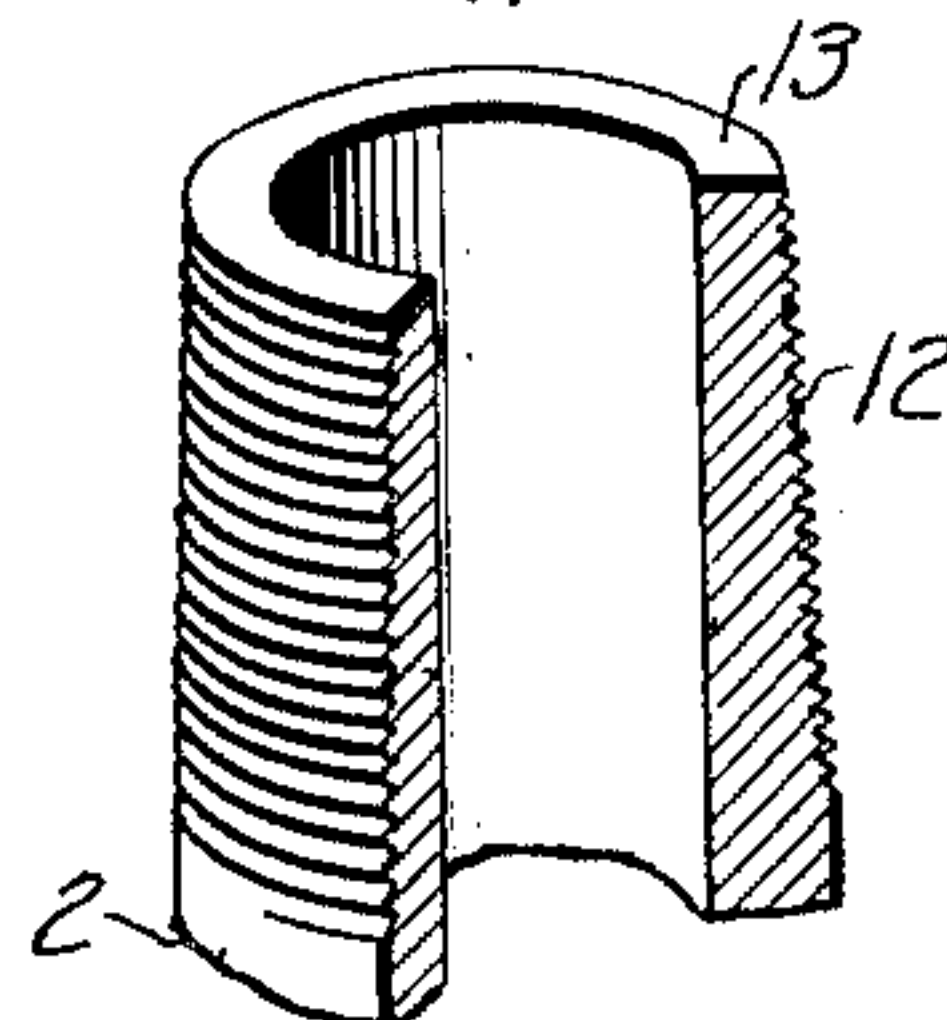
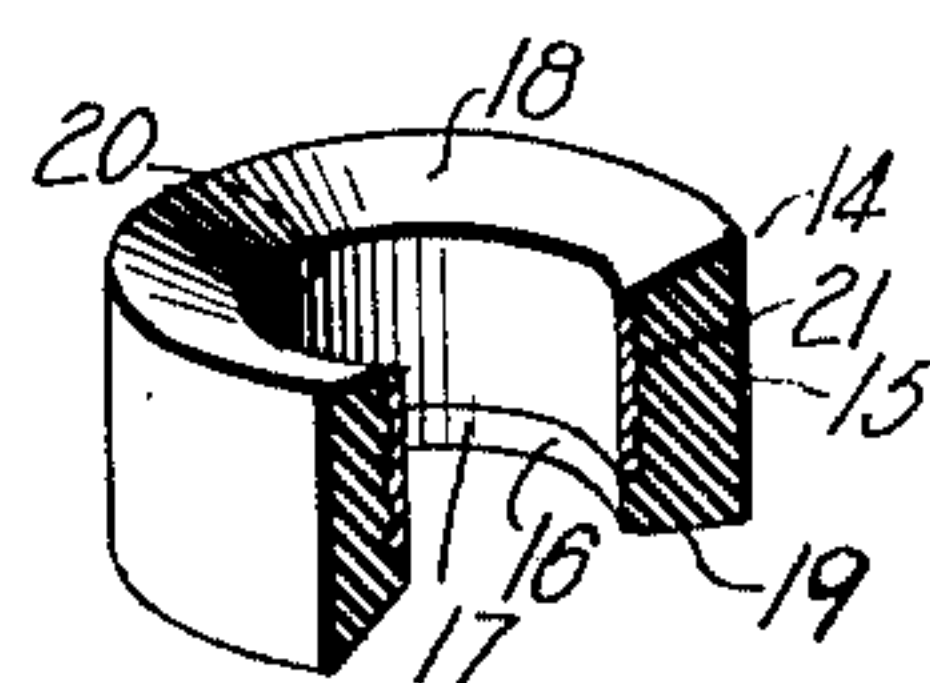
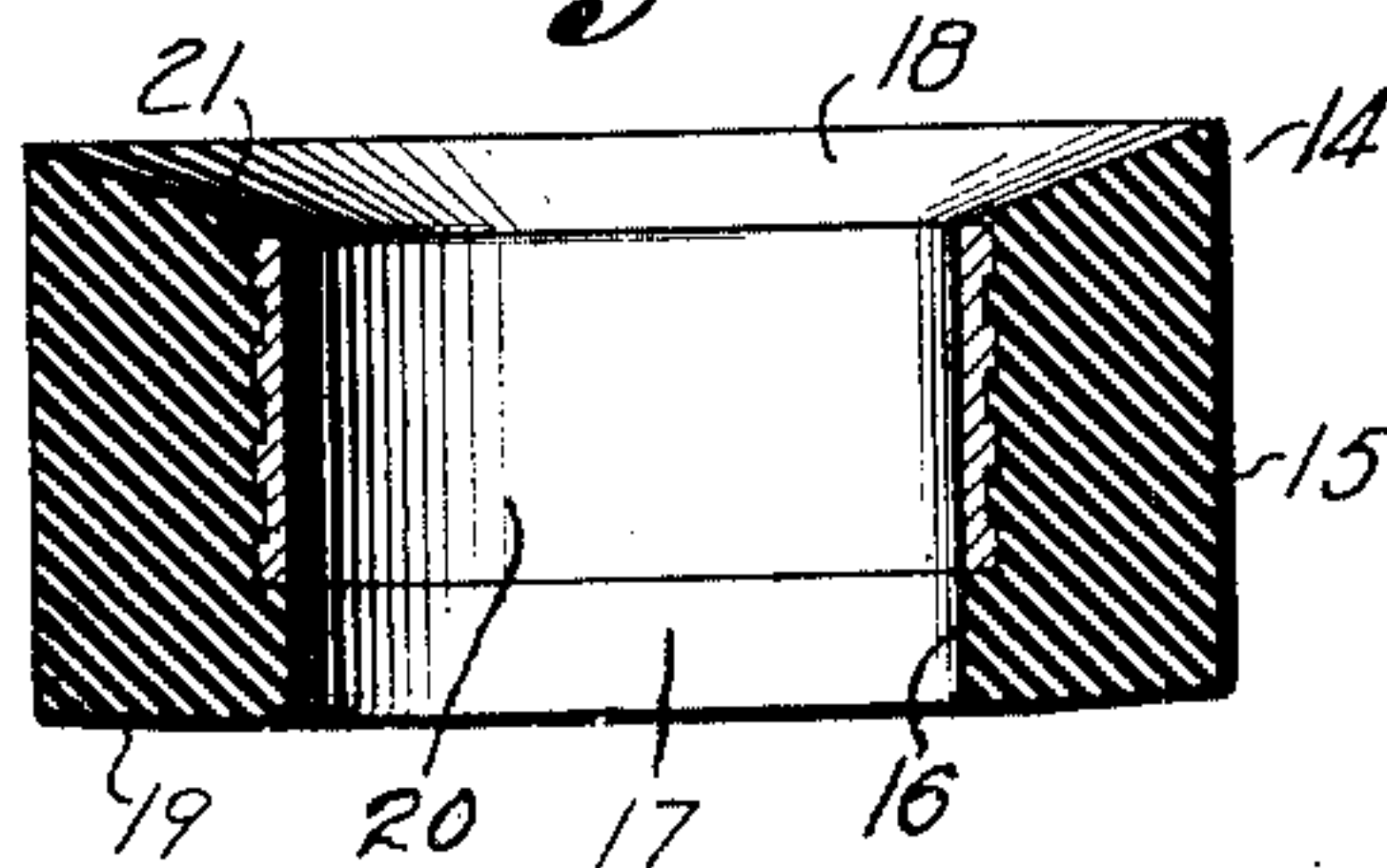


Fig. 4.



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1,961,762

ROTARY DRILL PIPE COLLAR OR COUPLING
WITH SEALED JOINTS

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Application April 25, 1930, Serial No. 447,258

5 Claims. (Cl. 285—146)

My invention relates to pipe couplings or collars and more particularly to a device of that character for connecting the sections of drill pipe employed in rotary well drilling equipment.

5 The principal object of my invention is to provide a simplified coupling including sealing means for preventing escape of mud-laden fluid delivered under high pressure through a string of drill pipes to the drilling bit, for cleaning the bit, 10 for softening the formation, and for flushing drillings from the well hole.

It is a further object of my invention to reduce the cost and number of parts necessary in drilling equipment by providing a coupling having 15 duplicate ends for receiving either end of a drill pipe section and adapted to replace the tool joint commonly employed for this purpose.

In accomplishing these and other objects of my invention I have provided improved details of 20 structure the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a vertical section of part of a well hole, being formed with equipment including drill pipe connected with couplings embodying my inven- 25 tion.

Fig. 2 is an enlarged longitudinal sectional view of a coupling and connected drill pipes.

Fig. 3 is a perspective view of the coupling members and drill pipe ends in partly disassembled but 30 related condition, portions being broken away to better illustrate construction of the members.

Fig. 4 is a cross section of the sealing collar.

Referring more in detail to the drawing:

1 designates a well hole being drilled with rotary drilling equipment, including drill pipe sections 2, connected with couplings or collars 3 to 35 form a continuous string for rotating the drilling bit (not shown).

Casing 4, lining the well hole, serves as a return conduit for drilling fluid 5 delivered through the 40 drill pipe to the drilling bit for softening the formation and for carrying drillings from the well hole.

The coupling 3 includes a cylindrical body 6, 45 provided in each end with a duplicate internally threaded, tapered socket 7, terminating at its inner end in an unthreaded portion 8. A common base for the sockets comprises an intermediate, internal collar portion 9, having end walls 10 50 tapering abruptly from the portions 8 to a restricted opening 11 formed concentrically in the collar portion.

Externally threaded, tapered end portions 12 of the pipe sections are adapted to be threaded 55 into the sockets 7 and are provided with flat end

faces 13 for engaging sealing collars 14 mounted in the inner ends of the sockets.

Each sealing collar, preferably of very resilient rubber, is formed with an annular outer wall 15, a concentric inner wall 16 surrounding a central 60 opening 17, a concave inner end 18, and a slightly convex outer end 19.

Cemented in the sealing collar within the opening 17 is a metal reinforcing ring 20, preferably 65 provided on its outer surface with spaced annular ribs 21 for more securely anchoring the metal ring to the sealing collar, the metal ring terminating short of the outer end 19 to permit free flexing of the rubber when engaged by the flat end of a 70 pipe section.

In assembling a coupling constructed as described, with pipe sections, a sealing collar is mounted in each socket with its conical end facing the base of the socket.

As a pipe section is threaded into the socket, 75 the flat end 13 thereof engages the inner periphery of the convexed end of the sealing collar, thereby forcing the outer periphery of said end into engagement with the socket wall. Continued threading of the pipe into the socket moves 80 the sealing collar into closer relation with the socket base and due to the tapered walls of the socket the ring is gradually compressed until a perfect seal is produced between the pipe and coupling joint; inward bulging of the resilient 85 collar being prevented by the reinforcing ring 20.

The high pressure of drilling fluid exerted against the conical inner end of the sealing collar in flowing through the drill pipe further 90 prevents entrance of fluid and mud between the pipe section and coupling, which could not be obviated without the use of a sealing collar since it is impossible to form threads in couplings and on pipe sections sufficiently accurate to exclude 95 fluid under the high pressures employed in drilling wells.

The present connection has been tested over relatively long periods of time, under hydraulic pressures up to 7,600 pounds per square inch 100 without leakage.

What I claim and desire to secure by Letters Patent is:

1. In a coupling comprising a cylindrical portion provided at each end with identical tapered bores screw threaded for a portion of their 105 length only, an internally extending collar portion having a restricted central opening integral with said collar and intermediate said tapered bores, the top and bottom faces of said collar being tapered downwardly toward the central 110

opening, and a resilient sealing collar provided on a portion of its inner face with a metallic reinforcing ring having spaced annular anchor ribs on its outer surface located in each of said bores, 5 whereby said sealing collar is restrained against inward expansion for a portion only.

2. A rotary tool joint for use with drill pipes adapted for conducting fluid under high pressure including a single cylindrical member having 10 each of its two ends provided with a socket, the two sockets of said member terminating at a restricted central passageway, tapered packing seats on each side of said passageway in said sockets and means for sealing the joint including 15 packings in said sockets adapted to be closely pressed against walls of the joint member by inserting thrusts of pipe sections.

3. A rotary tool joint for use with drill pipes adapted for conducting fluid under high pressure including a single cylindrical member having 20 each of its two ends provided with a socket, the two sockets of said member terminating at a restricted central passageway, tapered packing seats on each side of said passageway in said 25 sockets and means for sealing the joint including packings in said sockets adapted to be closely pressed against walls of the joint member by inserting thrusts of pipe sections, said packings including a ring in each socket each having a 30 concavity facing the concavity in the opposite packing ring.

4. A device of the character described for use with drill pipe adapted for conducting fluid under pressure including a coupling member having a tapered socket, and a packing ring compressible 80 against the tapered wall of the socket by thrust of a pipe inserted into the socket to protect the coupling member against wear incident to escape of fluid between the coupling member and an inserted pipe section, said compressible ring having 85 on its inner periphery a relatively rigid reinforcing band having a plurality of portions embedded in the material of said ring.

5. A device of the character described for use with drill pipe adapted for conducting fluid under pressure including a coupling member having 90 a tapered socket, and a packing ring compressible against the tapered wall of the socket by thrust of a pipe inserted into the socket to protect the coupling member against wear incident to escape 95 of fluid between the coupling member and an inserted pipe section, said compressible ring having on its inner periphery a relatively rigid reinforcing band having a plurality of portions embedded in the material of said ring, said band 100 being of lesser thickness than that of the ring for restraining inward bulging of only a portion of the inner side of the ring.

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